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Effect of Physiotherapy Intervention in a Paediatric Patient of FIRE Syndrome: A Case Report

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ABSTRACT

FIRE Syndrome stands for Febrile Infection-Related Epilepsy Syndrome, it is a rare condition causing epileptic encephalopathy with a known febrile infection precedes the onset of epilepsy, but without any identified cause of infectious encephalitis. Management of the syndrome poses a challenge with less success and paucity of precise guidelines. Physiotherapy intervention which forms part of multi-disciplinary management, focuses to improve the lung function of patient, maintaining joint mobility and improving muscle function and functional capacity. We present a case of 12-year-old male diagnosed with FIRE Syndrome, showing the impact of physiotherapy intervention in collaboration with medical management which outlines the scope of multi-disciplinary treatment in this rare syndrome.

Keywords: FIRE Syndrome, Physiotherapy intervention, Case report.

INTRODUCTION

Febrile infection-related epilepsy syndrome (FIRES) is a rare catastrophic epileptic encephalopathy with known febrile infection preceding the onset of refractory status epilepticus, but without any evidence of identified infectious encephalitis [1][2]. With an estimated incidence of 1 in 1 million children. It mostly affects previously healthy children, between 3 and 15 years of age, with a median age of around 6 years old and a slight predominance in males [3]. The treatment of FIRES represents a significant challenge for clinicians and is associated with low success rates and with no specific treatment guidelines [4]. There is scarcity of research exploring the effect of Physiotherapy intervention in case of FIRE syndrome especially in paediatric population. Physiotherapy intervention which focuses on improving lung function, improving muscle function, maintain and improving joint mobility and augmenting activity levels in paediatric population. Collaboration between medical management and physiotherapy intervention for managing the effects associated with FIRE syndrome can vastly optimize patient recovery.

CASE PRESENTATION

We present to you a case of 12-year-old male presented to casualty on 01/04/2025 and was later admitted to PICU with complaints of repeated episodes of generalized tonic-clonic seizures (one episode on previous day and five episodes on day of admission). Despite the administration of antiepileptic medications, his neurological status was not improving. He was diagnosed with FIRE syndrome. Patient was placed on mechanical

ventilation on 06/04//2025 (PS-PEEP mode via ET intubation). He was then referred for physiotherapy treatment, on Examination he was conscious, intubated, tachypneic, had intercostal indrawing, reduced Peripheral Muscle strength and on auscultation, air entry was severely reduced in right upper zone. Crepitations were present all over the lung field. Later, tracheostomy tube was used for mechanical ventilation. The patient has following clinical findings generalized tonic-clonic seizures (each lasting 2-4 mins; involving all 4 limbs, up-rolling of eyes), post-ictal drowsiness, desaturation, respiratory distress (use of accessory muscles, Tachypnoea),

Peripheral Muscle atrophy, Klebsiella Pneumonia on C/S testing, Oedema over B/L UE from wrist till elbow, CSF Analysis showed increased protein levels. Patient had a prolonged hospital stay of 2 months in PICU and was then kept in Paediatric ward for 2 weeks and was then discharged on 17/06/25.

DISCUSSION

This case study demonstrates how a phased and planned physiotherapy intervention manages the patient's functional and pulmonary deficits. The patient was conscious, oriented and intubated during the intervention period. Initial emphasis was on airway clearance, respiratory efficiency, prevention of secondary problems, and early mobilization to enhance overall quality of life, the treatment protocol was developed utilizing a Multifacilitatory approach with steady progression.

During the initial 2 week, the primary focus was on reducing respiratory distress and preventing complications associated with prolonged immobilization. To improve secretion clearance, traditional chest physical therapy techniques, such as percussion, vibration and suctioning were used. The literature on pulmonary rehabilitation provides strong support for these therapies because they enhance ventilation-perfusion matching and lessen breathing effort [5]. In order to reduce joint stiffness, pressure sores, and circulatory complications—all of which are common in bedridden patients—active-assisted range of motion exercises, frequent positioning, and oedema management techniques were used concurrently. Transition activities like edge of bed sitting, supported standing were performed, while the patient was on mechanical ventilation. Patient was weaned from ventilator at the end of 2 weeks.

During the subsequent 2 weeks, diaphragmatic facilitation, muscle strengthening, and breathing pattern modification were prioritized [6,7]. Diaphragmatic facilitation, breathing exercises were used to increase diaphragmatic excursion and decrease dependency on accessory muscles, which improved respiratory efficiency. To combat deconditioning and get the patient ready for functional mobility, strengthening activities like isometrics and pelvic bridging were implemented [8]. Exercises for postural correction also helped to improve respiratory mechanics and thoracic alignment. Early mobilization and functional reintegration were the main goals of the advanced phase. Spot marching, ambulation, chair sitting all enhanced cardiovascular endurance the activation [8]. Thoracic expansion exercises and the Active Cycle of Breathing Technique were incorporated to enhance lung ventilation and facilitate efficient airway clearance. In general, the therapies' stepwise progression promoted functional independence while guaranteeing patient safety. After 8 weeks of PICU stay patient was shifted out to Paediatric ward. In the ward, mobility activities were continued to ensure complete recovery.

Better lung auscultation results, clear chest X-rays, increased tolerance to position changes, and a successful weaning off of ventilatory therapy were all indicators of the patient's clinical outcome. Neurological function was unaltered and the Glasgow Coma Scale (GCS) remained unchanged, indicating a lack of significant hypoxic or

structural brain injury—a critical component in the prognosis of FIRE syndrome [9,10].

This case emphasizes how crucial early and organized Physiotherapy is, for kids with FIRES, especially when it comes to reducing the negative consequences of extended ICU stay, enhancing breathing, and regaining functional independence. During the intervention, the need of family education in promoting ongoing care at home was also highlighted. In order to stabilize the child's condition and encourage recovery, a multidisciplinary strategy encompassing critical care, neurology, physiotherapy, and respiratory therapy was essential. This example shows that even in lengthy and severe clinical courses, substantial functional gains and improvements in quality of life can be attained with prompt, intensive physiotherapeutic intervention, despite the fact that FIRES is still a difficult diagnosis with high morbidity.

Day 7	Day 17	Day 28	Day 68
			
Both lung fields show hazy opacities bilaterally, especially perihilar—suggesting possible early infection or inflammation.	Breathing: Still patchy opacities but with slightly improved aeration. Consolidation in Right upper zone.	Minimal residual haziness in mid zones.	Clear lung fields bilaterally. No visible opacities or infiltrates.

Declaration by Authors

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